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RESEARCH ARTICLE

Ethnomathematics exploration of fisherman activities in the Rembang community

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Abstract: Mathematics is a science that cannot be separated from human life. It is also applied in various aspects of daily life, one of which is in the activities of fishermen in the Rembang community. And the purpose of this study is to describe the Ethnomathematics Exploration in the Activities of Fishermen of the Rembang Community. The method used is field qualitative, then relevant data is collected and analyzed, and finally concluded descriptively. The results showed that ethnomathematics activities in the fishing activities of the Rembang community included measuring the vessel to determine its type by multiplying the decimal number, as well as buying and selling activities in the market which involved addition and subtraction.

Keywords: Exploration, Ethnomathematics, Fishermen, Rembang

Abstrak: Matematika merupakan salah satu ilmu yang tidak bisa lepas dari kehidupan manusia. Bahkan ia juga diaplikasikan dalam berbagai aspek dalam keseharian salah satunya adalah pada kegiatan nelayan di masyarakat rembang. Dan tujuan dari penelitian ini adalah untuk mendeksripsikan terkait Eksplorasi Etnomatematika Pada Kegiatan Nelayan Masyarakat Rembang. Metode yang digunakan adalah kualitatif lapangan, lalu dikumpulkan data yang relevan serta dianalisis dan terakhir disimpulkan secara deksriptif. Hasil penelitian menunjukkan bahwa aktivitas etnomatematika pada kegiatan nelayan masyarakat Rembang mencakup pengukuran kapal untuk menentukan jenisnya dengan prosedur perkalian pada bilangan decimal, serta kegiatan jual beli hasil tangkapan dipasar yang melibatkan penjumlahan dan pengurangan.

Kata kunci: Eksplorasi, Etnomatematika, Nelayan, Rembang

INTRODUCTION

Mathematics is an important part of human life. Mathematics is not a universal domain of formal knowledge but is a collection of representations and symbolic procedures that are constructed culturally and by certain groups of people. It is necessary to strive for the abstractness of mathematical objects so that they can be realized more concretely it will make it easier for students to understand them. Therefore we need to explore the mathematical concepts contained in culture (Ubayanti et al., 2016).

The current development of modern society is increasingly rapid in real life. This raises the increasingly eroded existence of culture in Indonesian society. The modernization of cultural values is dwindling. This is evidenced by the loss of politeness starting from the words sorry, please, and thank you which have been heard again amid social society (Nurhuda, 2022). Today's children forget their culture and prioritize the technology culture which is growing rapidly. Where it is said that digital and technology so that most of them only want increased interaction, technology orientation, and acceleration in school (Nurhuda & Setyaningtyas, 2022). And one of the subjects most often avoided by students is mathematics. Mathematics cannot be separated from their daily lives, it even directly intersects with culture.

Ethnomathematics is the result of the relationship between mathematics and culture. Ethnomathematics can also be seen as a field of study to examine the way a person in a particular culture understands, expresses, and uses the concepts and practices of his culture which are described as something mathematical by researchers (Sari et al., 2018).

Indonesia is a country that has vast oceans and consists of thousands of islands. From this, it affects the livelihoods of the Indonesian population. Because Indonesia has a wide ocean. The application of mathematics often appears in everyday life as is done by the coastal communities of Rembang, where one of their livelihoods is fishing. When they spread their nets to catch fish they apply the concept

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of measurement. This is interesting because even though some of them have low education, they have a way of applying mathematics in their way (Iry & Rain, 2020).

Rembang is a district in Central Java that is located on the north coast. Because of its geographical location along the north coast, most of the livelihoods of the Rembang people are fishermen. In Rembang itself, there are many places where fish auctions are located, including in the Great Lakes, Lasem, Binangun, Sarang, Kalipang, Sluke, Glance, and Kragan areas.

Based on this description, it can be appointed as a subject in writing this article. Given that there is a relationship between mathematics and the fishing process carried out by fishermen, the authors take the titleEthnomatematics Exploration in the Activities of Fishermen of the Rembang Community.

METHODS

This study used a field qualitative descriptive method with an ethnographic approach. because researchers want to describe and describe in detail the ethnomathematics in fishing activities in the Rembang community which consists of the tools used in catching fish, the process of catching fish, and buying and selling of fishing results. In addition, researchers also want to know the relationship between fishing activities in the Rembang community and mathematics in terms of culture and mathematics as a science (Sirate, 2012).

RESULTS AND DISCUSSION

Based on the results of domain analysis, various ethnomathematics form in the fishing activities of the Rembang community (Roman, 2018). Various mathematical activities owned by the fishing community in the Rembang area include mathematical concepts which can be grouped into a) equipment and fishing. b) fishing process. c) the process of buying and selling catches.

Fishing equipment

The concept of mathematics as an activity for designing tools and making patterns contained in fishing equipment owned by fishermen is an example of ethnomathematics in the Rembang community, including:

Boat

Figure 1. Types of Ships

Without us knowing that based on the type of ship/boat it can be divided into:

- Micro fishermen are fishermen who catch fish in boats/boats measuring 0 (zero) GT (Gross Tonnage) up to 10 (ten) GT.
- Small fishermen are fishermen who catch fish in boats/boats measuring 11 (eleven) GT (Gross Tonnage) up to 60 (sixty) GT.
- Medium fishermen are fishermen who catch fish with boats/boats measuring 61 (sixty-one) GT (Gross Tonnage) to 134 (one hundred thirty-four) GT.
- Large fishermen are fishermen who catch fish with boats/boats over 135 (one hundred thirty-five) GT. (Daily, 2016:12-19)

Data processing for GT calculations for small fishing boats (vessels under 24 meters in size) can be carried out using the domestic method or the international method at the request of the ship owner (Permenhub No.8 of 2013). The domestic GT measurement method is (Decision of the Directorate General of Sea Transportation Number PY.67/1/13-90 article 24 paragraph (2)):

GT = 0.25 x V.....(1)

With:

0.25 = Is a coefficient based on the Decree of the Directorate General of Sea Transportation Number PY.67/1/13-90 article 24 paragraph (2).

V = Total volume of the room below the measuring deck plus the total volume of the room above the perfectly closed deck and not less than 1 m3 in size.

The formula used in domestic GT measurement methods to calculate volume below deck is:

V = L x B x D x f.....(2)

With :

L = length of the ship, measured from the deck behind the bow level to the deck in front of the stern level horizontally, this length is often referred to as the length of the measuring deck.

B = Width of the ship is the horizontal distance measured between the two outer sides of the ship's hull skin at the largest place, not including the bananas. This is because the domestic measurement method assumes that ships in Indonesia are generally made of wood.

D = Height of the ship is the perpendicular distance at its widest place, measured from the underside of the bottom frame to the underside of the deck to an imaginary height across the top of the fixed hull.

f = Factor, in this domestic measurement method the factor is determined based on the shape of the hull or the type of ship, namely:

- ✓ 0.85 for ships with full cross-sections or ships with flat bottoms, generally used for barges.
- ✓ 0.70 for vessels, of nearly full cross-section or with a slightly inclined bottom from center to side, generally used for motorized vessels.
- ✓ 0.50 for ships that are not included in groups (1) and (2) are generally used for sailing ships or motor-assisted sailing ships.

Most of the people of Rembang are micro fishermen and small fishermen. A sample of one of the ship samples at the location is calculated by the domestic method(Nay, 2018):

Figure 2. Ship size

Ship length = 20 meters
Ship width = 6 meters
Ship height = 1.45 meters
And f = 0.5

Then the GT (Gross Tonnage) is 21.75 which means small fishermen.

Net

The size of the nets used by the fishermen of the Rembang community adjusts to the size of the boats owned by the fishermen. Certainly, the size of the net is more than or equal to the length of the ship according to the skill of the fisherman in setting up the net. The wider the net is stretched, the more chances of getting fish.

In addition to the size of the net, we will also discuss net motifs. Pay attention to the following picture:

Figure 3. Fishing nets

From the picture above, several questions can be raised, namely:

a. What is the size of the tilt angle?
b. What angle is formed?

To answer the question above, first, look at the shape of the net, the net makes a flat shape in the form of an equilateral quadrilateral.

As we all know that in an equilateral quadrilateral or commonly called a square, each angle is 90 degrees Celsius, so the angles formed are right angles.

fishing process

In the process of catching fish, calculations are also carried out, precisely in measuring the placement of nets. This can be seen when determining the strategic location of the nets by reading the cardinal directions at sea. The calculation of laying nets is very important for fishermen to get maximum results (Primary & Sustainable, 2017).

The process of buying and selling catches

After going through the fishing process, of course, fishermen calculate the expenses. In this activity, a strategy for calculating the sum operation used by fishermen emerged. The following is the percentage of fishermen from the Rembang community who incur operational costs in one go at sea, a maximum of IDR 300,000 to IDR 550,000.

The fishermen of the Rembang community selling their catch (fish) are not always at the same price, as explained above that fishermen sell fish by looking at the capital spent besides that fishermen also see how many fish they get while sailing.

Several types of fish are usually caught by the fishermen of the Rembang community. The types of fish found were tuna, grouper, orange, squid, blanak, cob walang, and others. Each of these fish has a different selling value (Sunardi et al., 2019).

The existence of sea tides also affects the price of fish, usually when the sea water is high, the price of fish soars because the fish caught by fishermen are relatively small. Vice versa, when the sea water is receding, fishermen tend to get a lot of fish so the price of fish is relatively cheaper during low tide. The following is the average price of selling fish in the fish auction market:

Table 1. The average price of selling fish in the fish auction market

No.	Fish name	Price/kg
1.	Dorang 1 piece	Rp. 20,000.00
2.	Grouper 1 piece	Rp. 23,000.00
3.	Blank 1 piece	Rp. 15,000.00
4.	Cob stink bug 1 piece	Rp. 15,000.00
5.	Squid 1 kg	Rp. 18,000.00
6.	Crab 1 kg	Rp. 18,000.00
7.	Shrimp 1 kg	Rp. 18,000.00
8.	Anchovies rice 1 kg	Rp. 22,000.00

According to Yusuf (21), one of the fishermen's children said that the fish were not only sold as raw fish but some fish had been boiled, such as boiled or grilled.

The amount of money paid by the buyer is according to the number of fish he will buy, for example, a buyer wants to buy 2 groupers and 1 kg of anchovies, so the buyer pays 2 x 23,000 + 22,000 = 68,000 Rupiah.

CONCLUSIONS AND RECOMMENDATION

Based on the results of the study it can be concluded that ethnomathematics activities in the fishing activities of the Rembang community are: measuring vessels to determine the type of ship/boat is a multiplication procedure on decimal numbers, as well as buying and selling activities of catches in the market which involve addition and subtraction.

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